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FISH FURUNCULOSIS

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INTRODUCTION

Furunculosis is a disease which causes greatest losses among salmonid fishes. Other species of fish may become infected from diseased salmonids and may suffer heavy mortalities.

IDENTIFICATION

It derives its name from boil-like lesions, one of the first symptoms described. This, however, is not the most frequent or the most typical symptom of fish furunculosis. Other symptoms are blood-shot fins, bloody discharge from the vent and many small hemorrhages (petechiae) in muscles and other tissue and necrosis of the kidney. In acute form furunculosis is a systemic bacterial infection, a septicaemia, with bacteria present in the blood, in all tissues and lesions. The only positive diagnosis can be made by the isolation and identification of the causative organism. Losses due to furunculosis can be from very high to insignificant depending on the species and resistance of infected fish and ecological conditions.

CAUSE OF THE DISEASE

Bacterium salmonicida has just been placed in the genus Aeromonas, therefore it is now named Aeromonas salmonicida. It is a non-motile gram-negative bacterium which grows well on standard bacteriological media. On special media it produces typical brown pigment.

SOURCE AND RESERVOIR OF INFECTION

It is almost certain that fish are carriers of the pathogen. In cases of latent infection, it is usually present in the posterior kidney and is eliminated with feces.

MODE OF TRANSMISSION

Through water or food contaminated by bacteria from lesions or feces from infected fish. Lesions caused by rough handling or parasites may facilitate infection.

INCUBATION PERIOD

One week under optimum conditions for the disease. At low temperatures (below 7° C or 45° F) infection becomes latent without symptoms or mortalities.

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PERIOD OF COMMUNICABILITY

Fish resistant to this disease probably act as carriers indefinitely.

SUSCEPTIBILITY AND RESISTANCE

Salmonid fishes are most susceptible. Among trouts, the eastern brook trout is most susceptible and rainbow trout most resistant. Great differences in susceptibility exist between various strains of brook trout. Other groups of fresh water fishes also may become infected with resulting losses.

RANGE

World-wide except Australia and New Zealand. At temperatures below 45° F the infection may remain asymptomatic.

METHODS OF CONTROL

A. Preventive measures.

Preventive measures are much more important than treatments. They are as follows:

a. Disinfection of fish eggs.
b. Elimination of carriers from the hatchery water supply.
c. Whenever there is any recent history of this disease in a fish hatchery all utensils must be disinfected after each use.
d. Water used for fry and fingerling fish must not be inhabited by any fish.
e. If hatchery had recent outbreaks of furunculosis only strains of trout most resistant to this disease should be raised.

B. Therapy.

Sulfonamides such as sulfamerazine (or sulfaguanidine, sulfadiazine, sulfamethazine or sulfisoxazole) given orally with food at a rate of 10 grams (8 to 12) per 100 lbs. of fish per day (22 grams per 100 kilograms). Among antibiotics which were tried, chloramphenicol (Chloromycetin) and oxytetracycline (Terramycin) are the best. Dosage is 2.5 to 3.5 grams of pure antibiotic activity for 100 pounds of fish per day mixed with food (5 to 7.5 grams per 100 kilograms of fish).

It has been found recently that furazolidone (Furoxone), one of the newer nitrofuran drugs, is very promising in the treatment of furunculosis. One of the state hatcheries which is investigating the value of this drug for the treatment of furunculosis in brook trout obtained good results after two weeks of treatment with 4.5 grams of Furoxone per 100 pounds of trout per day mixed with food. Since this new treatment is still being investigated, it should be used at this time only on an experimental basis and on the risk of the user. Further information on Furoxone can be obtained from Dr. G. E. Short, Division of Veterinary Medicine, Eaton Laboratores, Norwich, N. Y.

Treatments with drugs should only be considered as stop-gap measures until the sources of infection are eliminated or disease resistant strains of trout introduced.

ANNOTATED BIBLIOGRAPHY

There is a large number of publications dealing with this disease. More papers were published on this than on any other fish disease. Therefore this bibliography contains only the most recent and the most important papers.

* Davis, H. S.
1953. Culture and Diseases of Game Fishes. University of California Press, Berkeley, Cal. Furunculosis pp. 247-255.
An excellent review of the symptoms, nature and control. Out of date regarding the use of antibiotics.

* Griffin, P. J.
1952. A rapid presumptive test for furunculosis in fish. Prog. Fish-Cult., Vol. 14, pp. 74-75.
This simple method usually permits an almost certain diagnosis of furunculosis within 24 hours.

Griffin, P. J., S. F. Snieszko and S. B. Friddle
1953. A more comprehensive description of Bacterium salmonicida. Trans. Am. Fish. Soc., Vol. 82, pp. 129-138.
The most recent and detailed description of the bacterium causing fish furunculosis.

Gutsell, J. S. and S. F. Snieszko
1949. Dosage of sulfamerazine in the treatment of furunculosis in brook trout, Salvelinus fontinalis. Trans. Am. Fish. Soc., Vol. 76, pp. 82-96.
Dosage which gave the best control of furunculosis without any losses due to the toxicity of the drugs was 8 grams per 100 pounds of trout per day (17.5 grams per 100 kilograms of fish). The usually recommended dosage is 8-12 grams to provide sufficient amount of the drug if the weight of fish is over or underestimated, or to compensate for the weight increase caused by growth during the period of treatment.

Mackie, T. J., J. A. Arkwright, T. E. Pryce-Tannatt, J. C. Mottram, W. D. Johnston and W. J. M. Menzies and Furunculosis Committee
1930. Iterim report of the furunculosis committee. H. M. Stationery Office. Edinburgh. p. 65.

1933. Second interim report of the furunculosis committee. H. M. Stationery Office. Edinburgh. p. 81.

1935. Final report of the furunculosis committee. H. M. Stationery Office. Edinburgh. p. 67.
This is the classic British research paper on fish furunculosis. It contains valuable information on the disease, the pathogen, and epidemiology. It was published before any treatments were known.

* McCraw, B. M.
1952. Furunculosis of Fish. U.S. Fish and Wildlife Service, Special Scientific Report: Fisheries No. 84. 87 pp.
This is the most complete review paper on fish furunculosis. World literature is reviewed up to the year 1950 or even 1951. It contains detailed description of Bacterium (Aeromonas) salmonicida, methods of its isolation and identification, pathology of the disease, symptoms, epidemiology, diagnosis and treatment. The problem of furunculosis is so well reviewed in this paper that there is no need for anyone, except a research worker, to read in original any of the papers reviewed by the author.

* O'Donnell, J. D.
1947. The disinfection and maintenance of trout hatcheries for the control of disease, with special reference to furunculosis. Trans. Am. Fish. Soc., Vol. 74, pp. 26-34.
This is the best paper on general sanitation in a trout hatchery. Out of date regarding treatments for furunculosis.

* Snieszko, S. F.
1957. Disease resistant and susceptible populations of brook trout (Salvelinus fontinalis). Contributions to the Study of Sub-population of Fishes. U.S. Fish and Wildlife Service, Special Scientific Report: Fisheries No. 208, pp. 126-128.
A short review of the problem of the resistance to diseases. Experiments are described on the determination of resistance of certain strains of brook trout to furunculosis and ulcer diseases. Some strains of brook trout have a high degree of resistance to these diseases. See also the paper by L. E. Wolf.

* Snieszko, S. F. and G. L. Bullock
1957. Determination of the susceptibility of Aeromonas salmonicida to sulfonamides and antibiotics, with a summary report on the treatment and prevention of furunculosis. Prog. Fish-Cult., Vol. 19, pp. 99-107.

Sulfonamide-resistant strains of the organism causing fish furunculosis have appeared recently as the result of frequent use of sulfa drugs. Methods are given for rapid detection of such sulfa-resistant strains. Up-to-date methods of control of fish furunculosis are described. They include use of sulfonamides, antibiotics, sanitation and disease-resistant strains of fish.

Snieszko, S. F. and S. B. Friddle
1951. Tissue levels of various sulfonamides in trout. Trans. Am. Fish. Soc., Vol. 80, pp. 240-250.

1952. Further studies on factors determining tissue levels of sulfamerazine in trout. Trans. Am. Fish. Soc., Vol. 81, pp. 101-110.
Results presented in these two papers permit rational use of sulfonamides in the treatment of furunculosis and other bacterial fish diseases.

* Snieszko, S. F. and E. M. Wood
1955. The effect of some sulfonamides on the growth of brook trout, brown trout, and rainbow trout. Trans. Am. Fish. Soc., Vol. 84, pp. 86-92
Sulfonamides in the diet of rainbow trout have no adverse effect on growth of these fish. Growth of brook trout is somewhat retarded by some sulfonamides. All tested sulfonamides, except sulfisoxazole (Gantrisin), sharply reduced the growth of brown trout.

* Wolf, L. E.
1954. Development of disease-resistant strains of fish. Trans. Am. Fish. Soc., Vol. 83, pp. 342-349.
It contains general information on disease resistance in animals and author's observations on resistance to furunculosis and ulcer disease in different strains of brook and brown trout. This is a very important paper. See also paper by S. F. Snieszko, 1957.

Wood, E. M., W. T. Yasutake and S. F. Snieszko
1955. Sulfonamide toxicity in brook trout. Trans. Am. Fish. Soc., Vol. 84, pp. 155-160.
Prolonged treatment of brook trout with sulfamerazine may cause sterility and massive kidney damage.

* Papers indicated by an asterisk are of special importance to fish culturists.

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